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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 09/484,799 | 01/18/2000 | Jeremy Barker | VT-1869 | 1118 |
| 33204 | 7590 | 04/09/2004 | EXAMINER | |
| VALENCE TECHNOLOGY, INC. 301 CONESTOGA WAY HENDERSON, NV 89015 | | | CHANAY, CAROL DIANE | |
| | | ART UNIT | | PAPER NUMBER |
| | | 1745 | | |

DATE MAILED: 04/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | |
|------------------------------|---------------|---------------|
| Office Action Summary | Applicant No. | Applicant(s) |
| | 09/484,799 | BARKER ET AL. |
| Examiner | Art Unit | |
| Carol Chaney | 1745 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 04 November 2003.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 179-226 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 179-226 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20010913.

4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) Notice of Informal Patent Application (PTO-152)

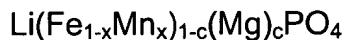
6) Other: _____.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 179-186 are rejected under 35 U.S.C. 102(b) as being anticipated by Ni et al., "Triphylite-lithiophilite series in China", *Yanshi Kuangwuxue Zazhi* (1989), 8(2), 144-55.

Ni et al. disclose chemical compositions of the triphylite (LiFePO_4)-lithiophilite (LiMnPO_4) series of compositions found in China. Ternary diagrams of Mn-Fe-Mg(Ca) at the M(2) sites of the triphylite-lithiophilite series of compounds are shown in Fig. 1 of the Ni et al. article. The phase diagrams are understood to disclose the compounds at the ends of the series of compounds. Thus, compounds of the form $\text{LiFe}_{1-y}\text{M}_y\text{PO}_4$ where M is Mg or Ca are disclosed, as well compounds of the form:



Thus, the claims are anticipated.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 179-227 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over the claims of U.S. Patent No. 6,716,372. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims and the patented claims both encompass compass compounds of the form $\text{LiFe}_{1-y}\text{M}_y\text{PO}_4$ where M is Mg or Ca.

Claims 179-227 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims of copending Application No.10/092,317. Although the conflicting claims are not identical, they are not patentably distinct from each other because the compound and cathode active materials claimed in the instant application, $\text{Li}_a\text{Fe}_{1-y}\text{M}_y\text{PO}_4$ where M is Be, Ca, Sr, Ba, are encompassed by the compounds claimed in application 10/092,317.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 179-227 are rejected under 35 U.S.C. 103(a) as being unpatentable over Armand et al., US Patent 6,514,640.

Armand et al. disclose lithium ion battery cathode materials based on the general formula LiMPO_4 having olivine structures. "Modified olivine structures" are also included in the Armand et al. disclosure. The modified olivine structures have the general formula:

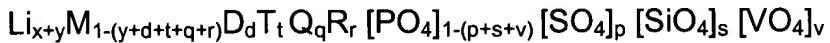


where M may be Fe^{2+} or Mn^{2+} or mixtures thereof; D may be a metal in the +2 oxidation state, preferably Mg^{2+} , Ni^{2+} , Co^{2+} , Zn^{2+} , Cu^{2+} , or Ti^{2+} ; T may be a metal in the +3 oxidation state; Q may be a metal in the +4 oxidation state; R may be a metal in the +5 oxidation state. x, y, d, t, q, r, p, s, and v may be between 0 (zero) and 1 (one), with at least one of y, d, t, q, r, p, s, or v differing from 0. In a preferred embodiment y, d, t, q, r, and v may vary between 0 (zero) and 0.2 (2/10). (Column 2, line 63 – column 3, line 40.) Considering the disclosure as a whole, it is clear that Armand et al. teach battery cathode materials with an olivine structure, in which the Fe^{2+} ions may be partially substituted by other elements, and specifically may be substituted by Mg^{2+} . The phosphorous anions analogously may be substituted by any of S, Si, V or mixtures thereof. The substitution is constrained by site occupancy. Each Fe^{2+} site in the structure can contain only one element. Each site holds either iron or a substitute. Likewise, each P site must contain one element, either P, S, Si or V. Further, the

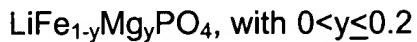
compound must be electrically neutral; the anionic charge must balance cationic charge.

The negative electrode of the battery may be lithium-carbon intercalation compounds or lithium-titanium spinels. (Column 3, lines 51-64.)

The disclosure of Armand et al. differs from applicants' claims in that Armand et al. do not explicitly recite the compound $\text{LiFe}_{1-y}\text{Mg}_y\text{PO}_4$ as a cathode material. However, applicants' invention as a whole would have been obvious to one of ordinary skill in the art based upon the Armand et al. reference. Armand et al. disclose a class of cathode materials given by the general formula:



It is noted that in this formula, only one of y, d, t, q, r, p, s, or v must differ from 0. Thus, the Armand et al. disclosure encompasses single ion substitutions of 'M'. Because Mg^{2+} is listed as a preferred metal 'D', the olivine structure is preferably modified by aliovalent or isochARGE substitutions (column 2, lines 51-52), and Mg^{2+} is given as a specific example of a cation isochARGE with Fe^{2+} (column 2, lines 42-57), a lithium ion battery with a cathode active material of the formula



would have been obvious to one of ordinary skill in the art based upon the Armand et al. disclosure.

Response to Arguments

Applicant's arguments filed 20 October 2003, and resubmitted 04 November 2003 have been fully considered but they are not persuasive.

Applicants assert Ni et al. do not teach or suggest use $\text{LiFe}_{1-y}\text{M}_y\text{PO}_4$ compounds in a secondary electrochemical cell. In response, it is noted that claims 179-186 in the instant application are directed to compounds *per se*, and thus are encompassed by the Ni et al. disclosure. In response to applicants' assertion that Ni describes minerals having compositions where the major metal constituents are Fe^{+2} **and** Mn^{+2} , it is noted that Ni et al. also disclose the endpoints of the triphylite-lithiophilite series of compounds through the phase diagrams presented in Fig. 1. Thus, the compounds $\text{LiFe}_{1-y}\text{M}_y\text{PO}_4$ and $\text{LiMn}_{1-y}\text{M}_y\text{PO}_4$ where 'M' is Mg and/or Ca are disclosed along with compounds containing both Fe^{+2} **and** Mn^{+2} .

Applicants assert Armand et al. make it clear that the modified olivine general formula is subject to four "conditions" which cause the claimed $\text{LiFe}_{1-y}\text{M}_y\text{PO}_4$ species to be excluded from the scope of the Armand general formula. In response, it is noted that the "four conditions" are simply a summary of the conditions of site occupancy and electroneutrality. . (See Armand et al., column 3, lines 27-28.) The total number of elements on the Fe^{+2} sites and the total number of elements on the P sites are not changed from the "pristine" olivine structure LiFePO_4 , and the charge on the anion sites

must equal the charge on the cation sites. Clearly, these conditions are met for the compound $\text{LiFe}_{1-y}\text{Mg}_y\text{PO}_4$ since $1-y+y = 1$ (site occupancy) and the compound is obviously electrically neutral (electroneutrality). Thus, $\text{LiFe}_{1-y}\text{Mg}_y\text{PO}_4$ is encompassed by the Armand et al. disclosure. As discussed previously, there is an error in the "conditions" recited by Armand et al. because the compounds disclosed by Armand et al. also cannot meet these "conditions". Testing an equation with the simplest case, as was done in the previous office action is common practice. Conditions for charge neutrality and site occupancy should not change between modified and unmodified olivine structures.

Applicants assert Armand et al. have not provided any motivation "to pick and choose the particular selections to arrive at the claimed $\text{LiFe}_{1-y}\text{Mg}_y\text{PO}_4$ species." In response, it is first noted that the compound LiFePO_4 is specifically disclosed by Armand et al. as an ordered or "pristine" olivine structure. (Column 2, lines 28-31.) Modification of the pristine olivine on either or both of the anion or cation sites is taught. (Column 2, lines 46-48.) Thus only three possibilities: modification of the anion site, modification of the cation sites or modification of both anion and cation sites are taught. Choosing one of three modification types is not considered undue picking and choosing. Isocharge substitutions is specifically taught as preferable, and Mg^{+2} is specifically mentioned as an isocharge substituent for Fe^{+2} . One of ordinary skill in the art would conclude from the Armand et al. discussion of isocharge substitution that substitution of cation sites by substituting Mg for Fe has been suggested by Armand et al. The

compound $\text{LiFe}_{1-y}\text{Mg}_y\text{PO}_4$ could be readily envisioned from the disclosure by one of ordinary skill in the art.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carol Chaney whose telephone number is (571) 272-1284. The examiner can normally be reached on Mon - Fri 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Carol Chaney
Primary Examiner
Art Unit 1745

5-Apr-04